

**UNITED STATES PATENT APPLICATION**

**OF**

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**FOR**

**DRUM TYPE WASHING MACHINE**

[0001] This application claims the benefit of Korean Application(s) No. 10-2002-00074956 filed on November 28, 2002, which is/are hereby incorporated by reference.

## BACKGROUND OF THE INVENTION

### 5 Field of the Invention

[0002] The present invention relates to a washing machine, and more particularly, to a drum type washing machine, which is environment-friendly and has an excellent washing performance.

### Discussion of the Related Art

10 [0003] Generally, in a drum type washing machine, the laundry, detergent, and water are put in a horizontally installed drum and washing is performed using both dissolving power of the detergent and friction between the water and the laundry rotated by a driving force of a motor. Hence, the washed laundry is almost damage-free, avoids entanglement thereof, and undergoes the washing effects of beating and rubbing.

15 [0004] Lately, a drum type washing/drying machine enabling to dry the washed laundry is widely used.

[0005] FIG. 1 is a perspective view of a drum type washing machine according to a related art and FIG. 2 is a cross-sectional view of a drum type washing machine according to a related art.

20 [0006] Referring to FIG. 1 and FIG. 2, a drum type washing machine according to a related art consists of a tub 4, a drum 6, a driving unit 10, an inlet hose 12, a detergent box 14, and an outlet hose. The tub 4 is provided in a cabinet 2 enclosing an exterior of the washing machine, and the drum 6 is rotatably installed in the tub 4. A motor provided in the driving unit 10 is connected to the drum 6 through a rotational shaft 8 to rotate the drum 6.

[0007] Water is put in the tub 4 via the inlet hose 12, and a detergent is dissolved in the water supplied to the detergent box 14 connected to the inlet hose 12 so as to be supplied to the tub 14. Moreover, the outlet hose is provided for discharging externally the water held in the tub 4.

5 [0008] A door 18 is provided to an opening 2a formed at a front side of the cabinet 2. In this case, the laundry is put in or pulled out of the drum 6 through the opening 2a. A control box 20, in which an electric unit for controlling an operation of the washing machine and displaying an operational status of the washing machine, is provided to an upper front side of the cabinet 2.

10 [0009] A multitude of perforated holes 6a, via which the detergent and water put in the drum 4 pass, are formed at the drum 6, whereby the laundry in the drum 6 is washed by the perforating power of the detergent and water.

[0010] Moreover, a plurality of lifts 22 protrude from an inner circumference of the drum 6. The lifts 22 are rotated together with the drum 6 to generate a current of the water.

15 Moreover, the laundry is lifted up by the lifters 22 in a rotational direction of the drum 6 and falls down, whereby the washing of the laundry is performed by the friction with the water.

[0011] An operation of the drum type washing machine according to the related art is explained as follows.

20 [0012] First of all, the laundry is put in the drum 6 the door 18 is closed to cut off the opening 2a, and a washing mode is selected, in turn. Water and detergent are then supplied to the tub 4 via the inlet hose 12 and the detergent box 14. In this case, once the water is supplied to the tub 4 up to a predetermined level, the water supply stops. The driving force from the driving unit 10 is transferred to the drum 6 to rotate for performing a washing step.

[0013] After completion of the washing step, rinsing and dewatering steps are

sequentially executed through the similar procedures to complete the entire washing course.

[0014] Meanwhile, in case of the drum type washing/drying machine, a drying step is further executed to dry the dewatered laundry, whereby the entire washing/drying course is completed.

5 [0015] However, in the related art drum type washing machine, the laundry undergoes the excessive friction with the water to enhance the washing performance, whereby damage is caused to the laundry. Moreover, if an input amount of the detergent is increased to enhance the washing power, water pollution becomes a serious problem.

#### 10 SUMMARY OF THE INVENTION

[0016] Accordingly, the present invention is directed to a drum type washing machine that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

15 [0017] An object of the present invention, which has been devised to solve the foregoing problem, lies in providing a drum type washing machine, by which washing performance is increased as well as laundry damage and water pollution are reduced.

20 [0018] Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent to those having ordinary skill in the art upon examination of the following or may be learned from a practice of the invention. The objectives and other advantages of the invention will be realized and attained by the subject matter particularly pointed out in the specification and claims hereof as well as in the appended drawings.

[0019] To achieve these objects and other advantages in accordance with the present invention, as embodied and broadly described herein, there is provided a drum type washing

machine including a tub provided in a cabinet to hold water, a drum rotatably installed in the tub, at least one or more ceramics, and at least one or more ceramic receivers provided on an inside of the drum to hold the ceramic therein.

[0020] In this case, the ceramic receivers protrude along a circumferential direction of the drum in an axial direction of the drum to leave a predetermined distance from each other. The ceramic receiver is semi-circular, a curved portion of the ceramic receiver protrudes toward a rotational center of the drum, and a flat portion of the ceramic receiver adheres closely to the inside of the drum. Moreover, a housing of the ceramic receiver is formed long in the axial direction of the drum.

[0021] Meanwhile, the ceramic receiver includes a housing having one open side confronting the drum to enable to receive the ceramics and a multitude of holes at a circumference and a cover covering a topside of the housing.

[0022] In this case, the housing protrudes in an axial direction of the drum and is provided plurally along a circumferential direction of the drum to leave a predetermined interval from each other.

[0023] The housing is semi-circular, a curved portion of the housing protrudes toward a rotational center of the drum, and a flat portion of the housing is open to be covered by the cover and to adhere closely to the inside of the drum.

[0024] Moreover, a plurality of coupling holes are formed at the inside of the drum and a plurality of hooks protrude from a side of the housing to be fitted to the coupling holes, respectively. Preferably, the hooks are built in one body of the housing.

[0025] A guide groove is formed at a rim of the open side of the housing along an axial direction of the drum and the cover is inserted in the guide groove to be fixed thereto. In this case, the cover is built in one body of the drum. Moreover, a plurality of reinforcement

ribs protrude from the cover toward the inside of the drum.

[0026] Meanwhile, the ceramic includes silicon oxide. Moreover, the ceramic may include aluminum oxide.

[0027] And, the ceramic is preferably a sintered body including silicon oxide and  
5 aluminum oxide.

[0028] The ceramics are provided as a plurality of ball type ceramics differing in size from each other. Moreover, an inside of the ceramic can be formed of an elastic material and an outside of the ceramic can be coated with a sintered body including silicon oxide and aluminum oxide.

10 [0029] It is to be understood that both the foregoing explanation and the following detailed description of the present invention are exemplary and illustrative and are intended to provide further explanation of the invention as claimed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 [0030] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0031] FIG. 1 is a perspective view of a drum type washing machine according to a  
20 related art;

[0032] FIG. 2 is a cross-sectional view of a drum type washing machine according to a related art;

[0033] FIG. 3 is a cross-sectional view of a drum type washing machine according to the present invention;

[0034] FIG. 4 is a magnified cross-sectional view of 'A' in FIG. 3;

[0035] FIG. 5 is a cross-sectional view along a bisecting line 'B-B' in FIG. 4; and

[0036] FIG. 6 is a perspective view of a ceramic receiver according to the present invention.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0037] Reference will now be made in detail to the preferred embodiment(s) of the present invention, examples of which are illustrated in the accompanying drawings. Throughout the drawings, like elements are indicated using the same or similar reference designations where possible.

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[0038] A drum type washing machine according to the present invention includes a tub, a drum, a ceramic alkalifying water, and a ceramic receiver receiving the ceramic.

[0039] FIG. 3 is a cross-sectional view of a drum type washing machine according to the present invention.

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[0040] Referring to FIG. 3, an exterior of a drum type washing machine according to the present invention is covered with a cabinet 42, and an opening 52a, via which a laundry is put in or pulled out of a drum 56, is formed at a front side of the cabinet 52. A tub 54 is provided in the cabinet 52, and the drum 56 is rotatably installed in the tub 54. A driving motor 60 connected to the drum 56 through a rotational shaft 58 rotates the drum 56.

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[0041] Water is put in the tub 54 via the inlet hose 62, and is discharged via an outlet hose 64.

[0042] A control box (not shown in the drawing), in which an electric unit for controlling an operation of the washing machine and displaying an operational status of the washing machine, is provided to an upper front side of the cabinet 52.

[0043] A door (not shown in the drawing) is provided to open/close the opening 52a.

[0044] A detergent supply assembly 66 includes a detergent box 66a and a supply pipe 66b. The detergent box 66a stores a detergent inside and is connected to one end of the inlet hose 12. Hence, the water and detergent mixed with each other at one end of the inlet hose 62 are supplied to the tub 54 via the supply pipe 66b. The detergent is partially dissolved in the proves of being put in the tub 54 and the drum 56, and the rest of the detergent is dissolved by a current generated from a rotation of the drum 56 to alkalize the water to facilitate to wash the laundry.

[0045] A multitude of perforated holes (not shown in the drawing), via which the detergent and water pass, are formed at the drum 56. And, a ceramic receiver is installed inside the drum to provide a ceramic alkalizing the water.

[0046] The ceramic receiver denoted by 'A', as shown in FIG. 3 and FIG. 4, is installed on an inside of the drum 56. A ceramic 68, which alkalizes the water by reacting with the water to produce hydroxyl ions (OH<sup>-</sup>) is received in the ceramic receiver 'A'.

[0047] The ceramic 68 includes crystallized silicon oxide (SiO<sub>3</sub>) and aluminum oxide (Al<sub>2</sub>O<sub>3</sub>). The ceramic 68 is brought contact with water to react. When water (H<sub>2</sub>O) is supplied to the drum 56, silicon oxide (SiO<sub>3</sub>) and aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) are gradually dissolved in the water to produce hydroxyl ion (OH<sup>-</sup>). Since surface tension of alkalized water is reduced, the alkalized water enables to penetrate the laundry with ease, whereby filth can be well separated from the laundry. Besides, such substances of the ceramic do not pollute the water.

[0048] The ceramic 68 is formed spherical to maximize its reactive area with the water and is plurally received in the ceramic receiver with various sizes.

[0049] For instance, an inside of the ceramic 68 is formed of such an elastic material as a rubber and the like and the ceramic substances are attached to a surface of the elastic



material.

[0050] The ceramic receiver 'A' includes a housing 72a and hook 74.

[0051] In one embodiment of the present invention, a plurality of the ceramics 68 are received in the housing 72a, and a multitude of perforated holes 72c are formed at the housing 72a to enable the ceramics to be contacted with the water. The housing 72a is inserted in a coupling hole formed on the inside of the drum 56 to be coupled thereto by the hooks 74. In this case, the hooks 74 are preferably built in one body of the housing 72.

[0052] A front side of the receiver housing 72 is semi-circular so that a curved portion 72a protrudes toward a rotational center of the drum 56. A flat portion, which will be closely attached to the inside of the drum 56, of the receiver housing 72 is formed open so that a plurality of the ceramics 68 are received through the opening 72b. And, a plurality of the hooks are formed on a circumference of the opening 72b.

[0053] The housing 72 is formed long in an axial direction of the drum 56, and is installed to protrude toward the rotational center of the drum 56. Preferably, a plurality of the housings 72 are installed on the inside of the drum 56 in a circumferential direction to leave a predetermined distance from each other. Hence, since the housing 72 is rotated together with the drum 56 on washing, the laundry is caught on the housing 72 to be lifted in the rotational direction of the drum 56 and then falls down by gravity. Namely, a plurality of the housings 72 play a role of the related art lifts.

[0054] Meanwhile, a guide groove 72d is formed at a rim of the opening 72b of the housing 72, and a cover 76 slides in the guide groove 72d to be fitted thereto. The cover 76 presses a plurality of the received ceramics 68 to the housing 72, thereby preventing the ceramics 68 from making noise due to collisions between the ceramics or between the ceramics and the drum 56. Moreover, the drum 56 and the housing 72 are prevented from

being broken. And, the ceramics 68 are prevented from being separated from the housing 72.

[0055] In this case, the cover 76 has a plate shape, and a reinforcement rib 77 is provided to one side of the cover 76 confronting the inside of the drum 56. The reinforcement rib 77 extends to be contacted with the inside of the drum 56, thereby preventing the drum 56 from being distorted by the weight of the ceramics 68 and the housings 72.

[0056] Moreover, a rotational inertia of the drum 56 increases due to the weight of a plurality of the ceramics 68 and the ceramic receiver 'A', thereby interrupting generation of vibrations.

[0057] In another embodiment of the present invention, the cover is built in one body of the drum 56 and other elements are equivalent to those of the foregoing embodiment of the present invention. For convenience of assembly, a user loads the ceramics in the housing 72 and then makes the ceramic-loaded housing 72 slide in the guide groove 72d along the cover built in one body of the drum 56.

[0058] An operation of the above-constructed present invention is explained as follows.

[0059] First of all, the laundry is loaded in the drum 56 through the opening 52a, the opening 52a is closed by door, and the washing is executed, in turn. In this case, the water passes the inlet hose 62 and the detergent box 66 to be put in the tub 54 together with the detergent. After the water is supplied to the tub 54 to a predetermined level, the water supply stops. The drum 56 is then rotated by the driving motor 60.

[0060] As the drum 56 rotates, the water flowing in the housing 72 via the holes 72c of the housing reacts with the ceramics 68 to alkalize the water.

[0061] Hence, the drum type washing machine according to the present invention utilizes the alkalized water, the current according to the rotation of the drum 56, and the

housings 72 playing a role of lifts to remarkably enhance the washing power according to the mechanical friction.

[0062] After completion of the washing step, rinsing/dewatering/drying steps are sequentially executed.

5 [0063] Accordingly, the drum type washing machine according to the present invention has the following advantages or effects.

[0064] First of all, the ceramics received in the drum alkalize the water to play a role of the detergent but fails to pollute the water. Therefore, the present invention reduces the detergent consumption but improves the washing performance.

10 [0065] Secondly, the housings for receiving the ceramics are plurally installed on the inside of the drum, whereby lifts are unnecessary. Therefore, the present invention has a less risk of additional cost.

[0066] Thirdly, the ceramics and housings increase the rotational inertia, thereby interrupting the generation of vibrations of the drum.

15 [0067] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover such modifications and variations, provided they come within the scope of the appended claims and their equivalents.